FCC 93-136

Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

In the Matter of	)	
	)	
Amendment of Section 2.106 of	)	
the Commission's Rules to	)	ET Docket No. 93-59
Allocate Spectrum for	)	RM-8092
Wind Profiler Radar Systems	)	

NOTICE OF PROPOSED RULE MAKING and NOTICE OF INQUIRY

Adopted: March 10, 1993; Released: April 1, 1993

Comment Date: June 15, 1993
Reply Comment Date: July 15, 1993

By the Commission: Commissioner Marshall not participating.

INTRODUCTION

1. By this Notice of Proposed Rule Making (NPRM) and Notice of Inquiry (NOI), the Commission proposes to allocate 449 MHz for wind profiler radar systems (wind profilers) and solicits comment on whether wind profilers also should be accommodated at 915 MHz as proposed by Radian Corporation[1] (Radian), or in some other frequency band. Allocation of this spectrum for wind profilers will facilitate the automated collection of weather information, including data on severe storms that threaten life and property that is not obtainable in any other manner.

BACKGROUND

2. Wind profilers are sensitive Doppler radars that measure wind speed and direction at a variety of altitudes. Establishing a system of wind profilers will facilitate collecting accurate and timely atmospheric data usable in aviation to detect severe wind conditions and to plan flights; in meteorology to improve weather forecasts and warn of severe weather conditions; and in environmental studies to analyze movement of air masses carrying pollutants such as volcanic ash and acid rain. Currently, atmospheric data generally is provided by expendable

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[1] RM-8092, filed August 13, 1992.

radiosondes (weather balloons) that are launched periodically. The National Oceanic and Atmospheric Administration (NOAA), the Navy, the U.S. Customs Service, and others (such as universities and private entities) have experimented with wind profilers to explore the possibilities of obtaining real-time information on air movements.

3. Description of Wind Profiler Radar Systems.[2] Wind profilers emit pulsed signals vertically in 3 or 5 narrow beams, with mainbeams at zenith and 15-20 degrees off the vertical, separated by 90 degrees in azimuth. Their operation is affected by radio frequency (RF) propagation characteristics. Wind profilers typically can operate in the frequency range of 50-1200 MHz. Those that operate in the vicinity of 50 MHz can provide data up to an altitude of 30 kilometers (km), but lack resolution, particularly at low altitudes. Wind profilers operating in the vicinity of 1000 MHz can provide finer resolution but are impaired by precipitation, and useful altitude coverage is limited to 5-7 km. Frequencies in the range of 200-500 MHz offer a compromise between resolution and altitude coverage that enables wind and direction measurements at altitudes of up to 15-20 km.[3] Because wind profilers detect continuous low-level signals, they must operate in relatively interference-free locations.[4]

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[2] See letter from the Associate Administrator, National Telecommunications and Information Administration (NTIA) to the Chief Engineer, FCC dated January 17, 1992, and enclosure 1, Assessment of Bands for Wind Profiler Accommodation, NTIA Report 91-290 (1991) (study); enclosure 2, EMC Analysis Between Type A Wind Profilers and Remote Pickup Broadcast Stations (analysis); and enclosure 3, Interdepartment Radio Advisory Committee (IRAC) Memorandum.

[3] There are various types of wind profilers, each with different technical characteristics. The two major types identified in the NTIA study are referred to as types A and B. Type A profilers are characterized by a height coverage of 15-20 km, use of minimum-shift keying (MSK) phase modulation and complex coding algorithms to reduce sideband emissions, and require a bandwidth of 2 megahertz. Type B profilers cover an altitude of 5-7 km, do not use MSK or complex coding, and require a bandwidth of 4 megahertz. NTIA's study concluded that Type B profilers cannot be accommodated in the frequency range of 200-500 MHz due to their bandwidth requirement. Cf. Radian Reply Comments in RM-8092, requesting a total bandwidth of 12.5 megahertz for wind profilers it proposes to operate at 915 MHz.

[4] Study, p. 3-2.

4. NTIA Recommendation. Experimental wind profilers have been operating on 404.37 MHz but, despite using interference avoidance techniques that include not transmitting whenever satellites are within 30 degrees of the vertical profiler mainbeam, these profilers have interfered with the Cosmicheskaya Sistyema Poiska Avariynych (COSPAS) and Search and Rescue Satellite-Aided Tracking (SARSAT) satellites that have uplinks in the adjacent 406-406.1 MHz band. At the request of the IRAC, the NTIA conducted a study to identify a more suitable frequency for wind profilers, and concluded that 449 MHz is the best available frequency.[5] With the concurrence of IRAC, NTIA recommended to the Commission that Government wind profilers, which consist generally of the 30 existing and 200-300 planned units of the NOAA system, be accommodated at 449 MHz and phased out of the 400.15-406 MHz band by September 30, 1993.[6] Consistent with the NTIA recommendation, the Commission staff notified all non-Government wind profiler experimental licensees that they also will be required to move to 449 MHz by September 30, 1993.

5. Petition. In a related matter, on August 13, 1992, Radian requested that two megahertz, 914-916 MHz, be allocated on a secondary basis for non-Government wind profilers. Radian states that it has operated experimental wind profilers in this band and that a permanent allocation is needed because wind profilers operating in the 900 MHz band would be capable of finer resolution measurements at low altitudes than 400 MHz wind profilers can provide. After examining the comments on its petition, Radian responded that its request should have been for 12.5 megahertz and requested that 908.75-921.25 MHz be allocated instead of just 914-916 MHz.[7]

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[5] IRAC Memorandum, supra note 2.

[6] See NTIA letter requesting the Commission to initiate this proceeding, supra note 2.

[7] See Radian's pleading, "Reply Comments and Amended Petition for Rule Making," filed on December 17, 1992, as amended by an erratum filed on December 18, 1992. Radian states that upon review, it determined that the bandwidth of its system is 12.5 megahertz, the same bandwidth authorized under its experimental license and used by NOAA for its 900 MHz wind profilers. This comprehensive NOI provides an opportunity for all parties to address the spectrum needs of wind profilers in the 900 MHz range, including the necessary bandwidth.

DISCUSSION

Notice of Proposed Rule Making

6. Spectrum Allocation. In its wind profiler study, NTIA assessed the 216-225, 400.15-406, and 420-450 MHz bands to identify a suitable frequency for permanent accommodation of wind profilers in the United States that also has potential for international use.[8] The NTIA study rejected the 216-225 MHz band for domestic use because it is used extensively by the maritime mobile, land mobile, and amateur services; new radiolocation systems may not be authorized on these frequencies in the United States after January 1, 1990;[9] and the adjacent band is used intensively by broadcasting services. The study also rejected consideration of this band for international use because it is allocated to the broadcasting service on a primary basis in Regions 1 and 3. The 400.15-406 MHz band was rejected because of interference by experimental wind profiler radars to satellite systems that include COSPAS and SARSAT. The 420-450 MHz band is used by a number of major military land-based, shipborne, and airborne systems critical to the national defense. These radiolocation systems perform functions such as early warning of ballistic missile attack on the United States and long range search and track of potential hostile aircraft. The NTIA study concluded that the 440-450 MHz portion of the 420-450 MHz band contains the fewest number of Government assignments, and therefore offers the best potential location for wind profilers.

7. Currently, the 440-450 MHz band examined in the NTIA study is allocated on a primary basis for Government radiolocation operations by the military;[10] Government low-power remote control operations also are permitted;[11] and 449.75-450.25 MHz is

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[8] The International Radio Consultative Committee (CCIR) of the International Telecommunications Union (ITU) established Task Group 8/2 to study suitable frequency bands for operation of wind profiler radars. At the recommendation of the 1992 World Administrative Radio Conference (WARC-92), the CCIR is continuing its studies and preparing recommendations on technically suitable frequency bands, associated standards, and frequency sharing criteria. See Recommendation No. 621, Final Acts of the World Administrative Radio Conference, Malaga-Torremolinos (1992).

[9] See 47 C.F.R. § 2.106, Table of Frequency Allocations (Table), International Footnote 627.

[10] Id. at Footnote G2.

[11] Id. at Footnote G8.

allocated on a primary basis for space telecommand operations.[12] In addition, the 440-450 MHz band is allocated on a secondary basis to the Amateur Radio Service (amateur) and to Government and non-Government radiolocation systems for coastal radars.[13]

8. From within the 440-450 MHz segment, the NTIA study identified two candidate center frequencies for wind profilers, 441 and 449 MHz, that it concluded would have the least impact on the Government radiolocation systems that are primary users of this band. The advantage of 441 MHz is that it would be consistent with the Canadian allocation for wind profiler operations. The disadvantage of 441 MHz is that it would have significant impact on military operations, as most of those activities are on frequencies in the lower portion of the 440-450 MHz segment. Conversely, 449 MHz would have minimal impact on military operations, but potentially would impact 448-450 MHz amateur repeater operations. The NTIA study also concluded that to accommodate wind profilers on a primary basis internationally, the frequency band selected from the 440-450 MHz range would require upgrading the existing secondary radiolocation service allocation or adding a new primary meteorological service allocation to the international Table of Frequency Allocations. Based on this study and discussions with IRAC, NTIA selected 449 MHz. In its January 17, 1992 letter, NTIA requested that we allocate this frequency for Government wind profiler radar systems.[14]

9. We agree with NTIA that it is important to provide spectrum for wind profilers. These systems are of great value in providing accurate data to assist in predicting and determining weather conditions. Further, we believe that establishment of a national and possibly an international frequency for their operation could benefit U.S. industry. Therefore, consistent with the conclusions of the NTIA study, we propose to add a new footnote US329 to the domestic Table of Frequency Allocations that will provide for operation of Government wind profiler radar systems at 449 MHz on a primary basis, and to modify footnote G2 consistent with this proposal.[15]

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12 Id. at Footnote US87.

13 Id. at Footnotes US217 and US228.

14 NTIA letter, supra note 2.

15 We note that wind profiler operations near the U.S.-Canadian border require coordination with Canada. See Agreement on Radio Frequencies, June 16 and 24, 1965, United States-Canada, 16 U.S.T. 923, T.I.A.S. No. 5833.

10. We recognize that there are non-Government experimental wind profilers currently operating and that we have advised these licensees to change frequency to 449 MHz. The Department of Defense (DOD), through the IRAC, has expressed concern with respect to the use of the 448-450 MHz band for non-Government wind profilers because of possible interference to military operations. Notwithstanding these concerns, we believe it may be desirable for non-Government wind profiler systems to operate in this band provided that they do not adversely impact the military's operations. For example, researchers may have requirements to continue operation of their existing 400 MHz wind profilers. We therefore request comment on interest in, and the need for, operation of non-Government wind profiler systems in the 448-450 MHz band.

11. Protection of Existing Operations. NTIA proposes to minimize the impact on military operations in the 448-450 MHz band by requiring that wind profiler locations be pre-coordinated with the military services to protect fixed military radars; that wind profiler operations receive no protection from military mobile radiolocation stations; and that wind profiler stations provide protection to military mobile radiolocation stations that are engaged in critical national defense operations.[16] We have included these protections in proposed footnote US329 and request comment on any additional obligations that should be included. (See Appendix.) We also solicit comment on whether limits and restrictions on non-Government operation different from those we propose in US329 are needed to avoid interference to military operations that share this band. In addition, we note that the Federal Government is developing technical standards and coordination procedures (for example, required separation distances) to minimize potential interference between Government wind profilers and military radar systems. We request comment on whether non-Government systems should be required to comply with the same technical standards and coordination procedures as Government systems if non-Government wind profilers are authorized at 449 MHz.

12. NTIA's study concluded that a separation of 30-50 km would be needed to preclude co-channel interference by amateur operations to wind profilers.[17] Amateur operations most likely to be affected by the proposed wind profiler allocation are repeaters that operate in the 448-450 MHz segment. NTIA's study further concluded that a separation of 20-40 km would be required to preclude co-channel interference by wind profilers to amateur repeater operations. The study, however, also found that potential interference between amateur and wind profiler

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16 IRAC Memorandum, supra note 2.

17 Study, Table 6-17.

operations may be alleviated by using RF screens, such as perimeter fences or berms, at the profiler site and by altering repeater antenna radiation patterns.[18] We request comment on whether these methods could be used to prevent or resolve interference on a case-by-case basis, or whether specific rules governing interference are needed to ensure protection of wind profilers. One approach we intend to consider is whether we should specify a zone around each wind profiler within which amateur operations on 448-450 MHz would be precluded or otherwise limited, and how such a scheme would be administered. In this regard, we note that NOAA indicates that wind profilers operating in the 400 MHz range are planned primarily for rural areas.[19] We therefore expect that few amateur operations would be disrupted by these systems. We are not proposing to change the secondary allocation to the Amateur Radio Service in the 448-450 MHz band, inasmuch as amateur operations in this band already must protect primary operations from harmful interference. Therefore, amateur operations would be required to protect wind profiler operations the same as the other currently protected Government operations.[20] To minimize harmful interference and facilitate coordination, in proposed footnote US329 we require advance notification of at least 120 days by new wind profiler stations to all existing fixed amateur repeaters listed in the latest ARRL Repeater Directory that operate within 50 km of a proposed site. We request comment on this and the other requirements that would be codified by footnote US329 if adopted.

13. NTIA also examined the potential impact of wind profilers centered at 449 MHz on Remote Pickup Broadcast Stations (RPUs) that operate in the adjacent 450-451 MHz band.[21] The NTIA analysis concluded that the distance separation needed to preclude wind profiler interference to RPU ground operations is 5 km for 450 MHz RPUs and 2 km for 451 MHz RPUs. The analysis further concluded that the distance separation needed to preclude wind profiler interference to RPU airborne operations is 15 km for 450 MHz RPUs and 5 km for 451 MHz RPUs. Since NOAA plans to

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[18] Study, p. 2-6. See also "Wind Profilers: Applications and Characteristics," June 1992 QST at p. 50.

[19] According to the Director of the Office of Radio Frequency Management, NOAA, profilers "will be built in rural areas where electrical noise is reduced and land is cheaper." See "Wind Profiler Frequencies," April 1992 QST at p. 24.

[20] We note that the above-referenced NTIA letter states that representatives of the Department of Commerce and the American Radio Relay League (ARRL) are discussing steps to minimize the impact between wind profiler and amateur operations.

[21] Enclosure 2, supra note 2.

locate wind profiler radars primarily in rural areas, the potential for interference to adjacent channel RPU operations may be low. However, we note that RPUs and their associated operations also are found in rural areas. We invite comment on the potential for adjacent channel interference from 449 MHz wind profiler radar operations to RPUs in the adjacent 450-451 MHz band and to other services, such as the Private Land Mobile Radio Services, that operate above 451 MHz. Parties concluding that there is an unacceptable potential for interference also should address possible methods for resolving such interference.

Notice of Inquiry

14. We seek comment and information on the need for additional spectrum to accommodate other types of wind profiler radar systems. Specifically, we request comment on Radian's proposal to allocate 915 MHz for wind profilers and whether additional spectrum in any other band may be required or desired.

15. The 902-928 MHz band currently is allocated to the radiolocation service on a primary basis for Government use; on a secondary basis to the amateur radio service;[22] and band segments 902-912 MHz and 918-923 MHz are available on a non-interference basis for Automatic Vehicle Monitoring (AVM) systems.[23] In addition, 902-928 MHz is designated for industrial, scientific, and medical (ISM) equipment;[24] and unlicensed devices are permitted on an non-interference basis under Part 15 of the Rules.[25]

16. In its petition, Radian argues that compared to wind profilers that operate in the 400 MHz range, its experimental 915 MHz system provides finer resolution at low altitudes. This permits detection of wind shear conditions. Radian further states that experimental wind profiler systems have operated in the 902-928 MHz band for more than a decade and, with but one exception, have reported no interference to other users.[26]

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22 Table, Footnote US275.

23 Id. at Footnote US218.

24 Radiocommunication services operating in the 902-928 MHz band must accept harmful interference that may be caused by ISM equipment. See Table, International Footnote 707.

25 See 47 C.F.R. § 15.245.

26 Radian attributes the cause of the one case of interference to an incomplete pre-installation site survey. The interference was eliminated by reconfiguring the wind profiler. See Radian Reply Comments at p. 7.

17. In comments responding to the Radian petition, the ARRL argues that Radian's request is premature and should be dismissed because the work of CCIR Task Group 8/2 studying wind profilers has just begun; no technical standards have been developed for 900 MHz wind profilers; and Radian has not demonstrated how 900 MHz wind profilers will not cause interference to other users, including amateurs.[27] Similarly, AMTECH Corporation (AMTECH) contends that Radian has not submitted a sufficient technical analysis of potential interference and that the 902-928 MHz band may be needed for expansion of AVM operations.[28] Both EnScan, Inc. (EnScan) and Telxon Corporation (Telxon) oppose Radian's petition, arguing that 915 MHz wind profilers would interfere with devices that operate under Part 15 of the Rules.[29]

18. In response to the opposing comments of EnScan and Telxon, Radian argues that devices operating under Part 15 of the Rules are unprotected and must accept interference from all authorized services, and therefore should be required to accept interference from wind profilers. Radian reiterates that the finer resolution at low altitudes provided by 900 MHz wind profilers is necessary for environmental uses such as monitoring air pollution and ozone levels.

19. We agree with the commenting parties that there is insufficient information in our record regarding the potential impact of an allocation for wind profilers in the 902-928 MHz band on the current uses of this band. We also believe it necessary to explore the implications of a wind profiler allocation on the proposed AVM uses and the necessary bandwidth for the wind profilers that would operate in this band.

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[27] See ARRL Comments in RM-8092.

[28] See AMTECH comments in RM-8092. In PR Docket No. 93-61 the Commission proposed to establish a new Location and Monitoring Service in the entire 902-928 MHz band that would include monitoring and locating objects in addition to vehicles. See Notice of Proposed Rule Making in PR Docket No. 93-61, FCC 93-141, adopted March 11, 1993. Any action taken in ET Docket No. 93-59 will take into consideration PR Docket No. 93-61.

[29] EnScan manufactures and distributes automatic utility meter reading equipment, which operate on 910-920 MHz. Telxon manufactures teletransactional data collection and retrieval systems, which typically use spread spectrum transmissions on the 902-928 MHz band.

Accordingly, we solicit comment regarding all aspects of the need for, and implications of, an allocation of spectrum within the 902-928 MHz band for wind profilers. Specifically, we note that Radian initially requested 2 megahertz at 914-916 MHz for its proposed wind profiler operations, but in its reply comments sought to enlarge its request to 12.5 megahertz between 908.75 to 921.25 MHz. Therefore, we seek comment on the bandwidth needed for 900 MHz wind profilers. We also request that commenting parties address the technical characteristics of such wind profilers and their ability to share this spectrum with existing and proposed uses. We further ask parties to comment on the compatibility of wind profilers with the AVM devices proposed and operating in the same spectrum. Finally, we request comment on whether an allocation in the 900 MHz range should include Government as well as non-Government operations and on whether spectrum in addition to the bands at 449 and 915 MHz should be considered for wind profilers.

CONCLUSION

20. In the NPRM section of this proceeding, we propose to allocate the 448-450 MHz band for wind profilers on a co-primary basis. We believe that implementing an allocation at 449 MHz will serve domestic needs and also may establish a frequency that could be used internationally. This action is consistent with Commission goals of promoting efficiency in the allocation and use of the electromagnetic spectrum and promoting the vital interests of the American people in international communications and competitiveness.

21. In the NOI section, we seek comment on Radian's petition for a 915 MHz secondary allocation for wind profilers, request technical information on and bandwidth requirements of wind profilers at this frequency range, and note that Radian's request will be considered with other existing and proposed uses.

PROCEDURAL MATTERS

Regulatory Flexibility Analysis

22. The Commission certifies that the Regulatory Flexibility Act of 1980 does not apply to this rule making proceeding because if the proposed rule amendments are promulgated, there will not be a significant economic impact on a substantial number of small business entities, as defined by Section 601(3) of the Regulatory Flexibility Act. The Secretary shall send a copy of this Notice of Proposed Rule Making, including the certification, to the Chief Counsel for Advocacy of the Small Business Administration in accordance with paragraph 603(a) of the Regulatory Flexibility Act, Public Law No. 96-354, 94 Stat. 1164, 5 U.S.C. Section 601 et seq (1981).

Ex Parte Rules - Non-Restricted Proceeding

23. This is a non-restricted notice and comment rule making proceeding. Ex parte presentations are permitted, except during the Sunshine Agenda period, provided they are disclosed as provided in Commission rules. See generally 47 C.F.R. Sections 1.1202, 1.1203, and 1.1206(a).

Notice and Comment

24. Pursuant to applicable procedures set forth in Sections 1.415 and 1.419 of the Commission's Rules, 47 CFR Sections 1.415 and 1.419, interested parties may file comments on or before June 15, 1993, and reply comments on or before July 15, 1993. To file formally in this proceeding, you must file an original and four copies of all comments, reply comments, and supporting comments. If you want each Commissioner to receive a personal copy of your comments, you must file an original and nine copies. You should send comments and reply comments to Office of the Secretary, Federal Communications Commission, Washington, D.C. 20554. Comments and reply comments will be available for public inspection during regular business hours in the FCC Reference Center (Room 239) of the Federal Communications Commission, 1919 M Street, N.W., Washington, DC 20554.

Authority

25. This action is taken pursuant to Sections 4(i), 303(c), 303(f), 303(g), and 303(r) of the Communications Act of 1934, as amended, 47 U.S.C. Sections 154(i), 303(c), 303(f), 303(g), and 303(r).

Additional Information

26. For further information contact Carl Huie at (202) 653-8112, Office of Engineering and Technology, Federal Communications Commission, Washington, DC 20554.

FEDERAL COMMUNICATIONS COMMISSION

Donna R. Searcy

Donna R. Searcy
Secretary

APPENDIX

PROPOSED RULE CHANGES

Part 2 of Chapter I of Title 47 of the Code of Federal Regulations is proposed to be amended as follows:

PART 2 - FREQUENCY ALLOCATIONS AND RADIO TREATY MATTERS; GENERAL RULES AND REGULATIONS

1. The authority citation in Part 2 continues to read: AUTHORITY: Sections 4, 302, 303, and 307 of the Communications Act of 1934, as amended, 47 U.S.C. Sections 154, 302, 303, and 307, unless otherwise noted.

2. Section 2.106, the Table of Frequency Allocations is amended as follows:
   a. In columns 4 and 5 of the band 420-450 MHz, footnote US329 is added.
   b. The following sections of the Table of Frequency Allocations are amended to read as follows:

Section 2.106 Table of Frequency Allocations

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International table			United States table		FCC use designators	
Region 1 - allocation MHz	Region 2 - allocation MHz	Region 3 - allocation MHz	Government Allocation MHz	Non-Government Allocation MHz	Rule part(s)	Special-use frequencies
(1)	(2)	(3)	(4)	(5)	(6)	(7)
			420-450 RADIOLOCATION.	420-450 Amateur.	LAND MOBILE (90)	
					Amateur (97).	
* * *	* * *	* * *				
			664 668 US7 US87 US217 US228 US230 US329 G2 G8	664 668 US7 US87 US217 US228 US230 US329 NG135		

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c. United States footnote US329 is added:

US329 Wind profiler radars are authorized to operate on a primary basis in the radiolocation service in the frequency band 448-450 MHz with an authorized bandwidth of no more than 2 MHz centered on 449 MHz, subject to the following conditions: 1) wind profiler locations must be pre-coordinated with the military services to protect fixed military radars; 2) wind profiler operations will receive no protection from military mobile radiolocation stations; 3) wind profiler stations will provide protection to military mobile radiolocation stations that are engaged in critical national defense operations; and 4) wind profiler stations will provide the maximum reasonable advance notice, but in no case less than 120 days before commencing transmissions, to all existing fixed amateur repeaters listed in the latest ARRL Repeater Directory that operate between 448-450 MHz within 50 km of the proposed wind profiler site.

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d. Government footnote G2 is revised to include "and US329" and reads as follows:

G2 In the bands 216-225, 420-450 (except as provided by US217 **and US329**) 890-902, 928-942, 1300-1400, 2300-2450, 2700-2900, 5650-5925 and 9000-9200 MHz, the Government radiolocation is limited to the military services.